

CLAIMS

1. An apparatus for performing speed controlled eccentric exercise comprising:  
a frame;  
5 at least one support attached to said frame for supporting a user's body;  
at least one engagement member attached to said frame for engaging at least one  
part of the user's body, said engagement member being moveable in opposite  
directions;  
means for supplying power to said engagement member such that said  
10 engagement member is capable of exerting a force in a first direction at a predetermined  
speed;  
means for detecting a change in said predetermined speed after the user supplies  
a force to said engagement member in a direction opposite said first direction; and  
means for adjusting output of the power supply means to maintain said  
15 predetermined speed.
2. The apparatus of claim 1 wherein said at least one support comprises a seat.
3. The apparatus of claim 2 wherein said seat comprises a recumbent seat.
- 20 4. The apparatus of claim 3 wherein said recumbent seat is adjustable.
5. The apparatus of claim 4 further comprising a support structure for the  
recumbent seat wherein the recumbent seat is attached to the support structure and the support  
25 structure is attached to the frame.
6. The apparatus of claim 4 wherein said recumbent seat is positioned at an angle  
of about 15 degrees relative to a furthestmost position from the user of said at least one  
engagement means.
- 30 7. The apparatus of claim 1 wherein said at least one engagement member  
comprises a bar press or a crossbar.

8. The apparatus of claim 7 wherein said at least one engagement means further comprises at least one of a pedal and a hand grip.

9. The apparatus of claim 8 further comprising at least one strap for securing a user's foot to said pedal and a user's hand to said hand grip.

10. The apparatus of claim 1 further comprising a drive mechanism powered by said power supply means, said drive mechanism being attached to said at least one engagement member to move said at least one engagement member in said first direction.

11. The apparatus of claim 10 wherein said drive mechanism comprises at least one of a cogwheel, a reciprocating wheel, and a turn crank.

12. The apparatus of claim 11 wherein said drive mechanism is attached to said at least one engagement member by at least one of a belt, a chain, and a peg and slot configuration.

13. The apparatus of claim 12 wherein said at least one engagement member comprises a crossbar and said drive mechanism comprises a turn crank which moves in a counterclockwise direction.

14. The apparatus of claim 12 wherein said at least one engagement member comprises a bar press and said drive mechanism comprises a reciprocating wheel which moves said bar press in alternating forward and backward directions.

15. The apparatus of claim 1 wherein said power supply means comprises a motor.

16. The apparatus of claim 1 further comprising a safety element which prevents full extension of at least one of a user's joints during operation of the apparatus.

17. The apparatus of claim 16 wherein said at least one support comprises a recumbent seat, said at least one drive mechanism comprises a turn crank, said engagement member includes pedals for engaging a user's feet, and said safety element comprises a bar member positioned in front of said recumbent seat for maintaining a user's knees in a bent position while operating the apparatus.

18. The apparatus of claim 1 wherein said frame comprises a plurality of tubular shaped members.

19. The apparatus of claim 1 wherein said means for detecting a change in said predetermined speed comprises a sensor.

20. The apparatus of claim 1 wherein said means for adjusting output of said power supply means to maintain said predetermined speed comprises a central processing unit which sends signals to a motor controller.

21. The apparatus of claim 1 further comprising display means for displaying at least one of a deceleration power, a time elapsed, a user's heart rate, and at least one of a number of revolutions per minute or reciprocations per minute.

22. The apparatus of claim 1 further comprising a control panel for starting the apparatus, stopping the apparatus, and setting at least one of a timer, a speed, a performance goal, and a heart rate goal.

23. The apparatus of claim 1 for performing upper body eccentric exercise wherein said at least one engagement member comprises a pair of reciprocating bar presses or a pair of crossbars having a pair of hand grips attached thereto for engaging a user's hands.

24. The apparatus of claim 1 for performing lower body eccentric exercise wherein said at least one engagement member comprises a pair of reciprocating bar presses or a pair of crossbars having a pair of pedals attached thereto for engaging a user's feet.

25. A method for providing speed controlled eccentric exercise comprising the steps of:

providing an apparatus capable of applying a force against a user in a first direction at a predetermined speed;

allowing the user to resist the force in the first direction by applying a force in a direction opposite to the first direction;

5 monitoring the force applied by the user; and

controlling the force applied by the apparatus in response to the user's applied force to maintain the predetermined speed of the apparatus.

26. The method of claim 25 wherein the step of controlling the force applied by the apparatus in response to the user's applied force comprises the step of adjusting the apparatus applied force to equal the user applied force.

27. The method of claim 25 further comprising the step of displaying at least one of a deceleration power, a time elapsed, a user's heart rate, and a number of revolutions or reciprocations per minute.

28. The method of claim 25 wherein the step of providing an apparatus comprises the step of providing a recumbent exercise bicycle capable of applying a force against a user in a first direction by providing a torque in a counterclockwise direction.

29. The method of claim 25 wherein the step of providing an apparatus comprises the step of providing an apparatus having reciprocating bar presses.

30. A method for speed controlled eccentric exercise training comprising the steps of:

obtaining an apparatus capable of applying a force in a first direction;

selecting a predetermined speed at which to apply the force;

employing the apparatus to apply the force at the predetermined speed;

30 resisting the apparatus applied force by applying a force in a direction opposite to the force applied by the apparatus;

monitoring the speed of the apparatus in response to the resistive force; and

adjusting a drive mechanism of the apparatus to maintain the predetermined speed of the apparatus.

31. The method of claim 30 wherein the step of adjusting a drive mechanism of the apparatus comprises the step of adjusting power to the drive mechanism so that the apparatus applied force equals the resistive force.

5 32. The method of claim 30 further comprising the step of displaying at least one of a deceleration power, a time elapsed, a user's heart rate, and a number of revolutions or reciprocations per minute.

33. A device for speed controlled eccentric exercise comprising:

10 a frame;

a recumbent seat attached to the frame;

a turning crank attached to the frame such that said turning crank is accessible to a user's feet when seated in said recumbent seat;

15 a motor coupled to the turning crank such that the motor functions to rotate the turning crank in a counterclockwise direction at a predetermined speed;

means for detecting a change in said predetermined speed; and

means for adjusting output of the motor to maintain said predetermined speed.

34. The device of claim 33 wherein said recumbent seat is adjustable.

20 35. The device of claim 33 wherein said recumbent seat is positioned at an angle of about 15 degrees relative to said turning crank.

25 36. The device of claim 33 wherein said frame comprises a plurality of tubular shaped members.

37. The device of claim 33 further comprising a safety element which prevents full extension of a user's knees during operation of the device.

30 38. The device of claim 37 wherein said safety element comprises a bar member positioned in front of said recumbent seat for maintaining the user's knees in a bent position.

39. The device of claim 33 wherein said turning crank includes a pair of pedals positioned on opposite ends of said turning crank.

40. The device of claim 39 further comprising a strap on each pedal for securing the user's feet to the pedals while the device is in operation.

5           41. The device of claim 33 further comprising a support structure for the recumbent seat wherein the recumbent seat is attached to the support structure and the support structure is attached to the frame.

10           42. The device of claim 33 wherein said means for detecting a change in said predetermined speed comprises a magnetic sensor.

15           43. The device of claim 33 wherein said means for adjusting output of the motor to maintain said predetermined speed comprises receiving a signal by a central processing unit from said sensor and sending a signal from said processing unit to a controller for said motor.

            44. The device of claim 33 further comprising a display means for displaying at least one of a deceleration power, a time elapsed, a user's heart rate, and a number of revolutions per minute.

20           45. The device of claim 33 further comprising a control panel for starting the device, stopping the device, and setting at least one of a timer, a speed, a performance goal, and a heart rate goal.

25           46. A device for speed controlled eccentric exercise comprising:  
             a frame;  
             a recumbent seat attached to the frame;  
             a pair of leg presses attached to the frame;  
             means for reciprocating said leg presses in forward and backward movements;  
             a motor coupled to said reciprocating means for powering the reciprocating  
 30           movement of the leg presses at a predetermined speed;  
             means for detecting a change in said predetermined speed; and  
             means for adjusting output of the motor to maintain said predetermined speed.

47. The device of claim 46 wherein said recumbent seat is adjustable.

48. The device of claim 46 wherein said recumbent seat is positioned at an angle of about 15 degrees relative to said reciprocating means..

5 49. The device of claim 46 wherein said frame comprises a plurality of tubular shaped members.

50. The device of claim 46 further comprising a safety element which prevents full extension of a user's knees during operation of the device.

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51. The device of claim 50 wherein said safety element comprises a bar member positioned in front of said recumbent seat for maintaining the user's knees in a bent position.

52. The device of claim 46 wherein said pair of leg presses each includes a pair of  
15 pedals positioned near a top end of said leg presses.

53. The device of claim 52 further comprising a strap on each pedal for securing the user's feet to the pedals while the device is in operation.

20 54. The device of claim 46 further comprising a support structure for the recumbent seat wherein the recumbent seat is attached to the support structure and the support structure is attached to the frame.

55. The device of claim 46 wherein said means for detecting a change in said  
25 predetermined speed comprises a pressure sensor.

56. The device of claim 46 wherein said means for adjusting output of the motor to maintain said predetermined speed comprises receiving a signal by a central processing unit from said sensor and sending a signal from said processing unit to a controller for said motor.

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57. The device of claim 46 further comprising a display means for displaying at least one of a deceleration power, a time elapsed, a user's heart rate, and a number of revolutions per minute.

58. The device of claim 46 further comprising a control panel for starting the device, stopping the device, and setting at least one of a timer, a speed, a performance goal, and a heart rate goal.